Does Intensive Insulin Therapy Reduce The Severity of Organ Failures?

Sophie Penning, MSc; Jean-Charles Preiser, MD, PhD; Thomas Desaive, PhD; J. Geoffrey Chase, PhD

University of Liege, Cardiovascular Research Center, Liege, Belgium
Centre for Bio-Engineering, University of Canterbury, Christchurch, New Zealand

Objective

Organ failure is a common complication associated with increased mortality in intensive care unit (ICU) patients. Increased mortality is also associated with hyperglycemia and glycemic variability. This research evaluates the impact of an intensive vs. a conventional insulin therapy (IIT vs. CIT) on organ failures.

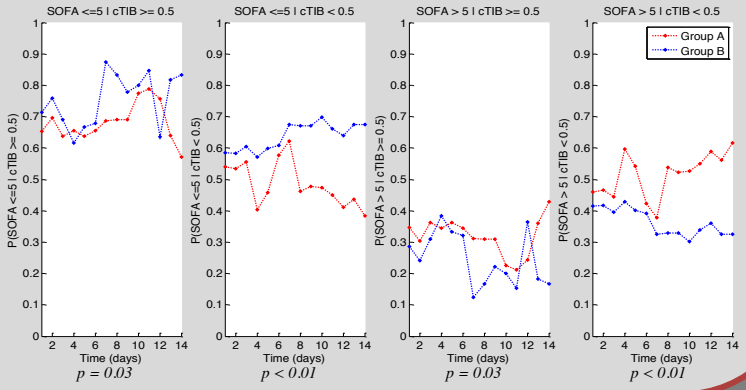
Method

- **Patients:**
  - N = 704 (Glucontrol study)
  - Randomized in IIT (blood glucose (BG) target: 4.4-6.1 mmol/L) or CIT (BG target: 7.8-10.0 mmol/L)
  - Matched for age, sex, diagnosis and severity of illness (APACHE II score)
- **Daily assessment:**
  - Organ failure: SOFA score
  - Glycemic outcome: cumulative time in a band ($cTIB$) in 4.0-7.0 mmol/L
  - Glycemic variability: lability index $\sum_n \frac{(BG_{n+1}-BG_n)^2}{h_{n+1}-h_n}$

Results

- Similar SOFA scores
- Different BG levels for IIT and CIT.
- More BG < 2.2 mmol/L for IIT (54 vs. 15 for CIT)
- Higher glycemic variability for IIT but also higher measurement frequency
- CIT associated with better $P(SOFA \leq 5)$ and IIT is associated with better $P(cTIB \geq 0.5)$
- Both ITs associated with better SOFA results when good glycemic outcome compared with bad glycemic outcome

Results are expressed as median [Inter-Quartile Range]		IIT BG target : 4.4-6.1 mmol/L	CIT BG target : 7.8-10.0 mmol/L	p-value
SOFA data	Initial SOFA	5.0 [3.0 - 7.0]	5.0 [3.0 - 7.0]	0.65
	Maximum SOFA	6.0 [4.0 - 8.0]	6.0 [4.0 - 8.0]	0.40
	Per-patient median SOFA	4.0 [3.0 – 6.0]	4.0 [3.0 – 6.0]	0.93
BG data (mmol/L)	Initial BG	7.3 [5.9 – 9.5]	7.2 [5.7 – 9.8]	0.48
	Minimum BG	3.7 [3.0 - 4.3]	5.1 [4.2 - 5.8]	0.00
	Maximum BG	11.1 [8.8 - 13.4]	11.3 [9.6 - 14.2]	0.06
	Per-patient median BG	6.3 [5.8 – 6.9]	8.0 [7.0 - 8.8]	0.00



Conclusion

IIT was unable to mitigate organ failure in two cohorts randomized to different glycemic targets. IIT provided better but not tighter control, with higher variability and more hypoglycemia than CIT.

Contact

Sophie Penning: sophie.penning@ulg.ac.be